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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/972,142	10/05/2001	Daniel A. Loffler	220772007420	5182

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EXAMINER	
KERNS, KEVIN P	
ART UNIT	PAPER NUMBER
1725	

DATE MAILED: 07/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/972,142	LOFFLER ET AL.	
	Examiner	Art Unit	
	Kevin P. Kerns	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) *25-48* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24 and 49-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-51* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 October 2001 and 16 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. This application contains claims 25-48 drawn to inventions nonelected without traverse. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-24 and 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over any one of Hamada et al. (US 5,609,834), Furuya et al. (JP 6-111838), or Nakamura et al. (JP 6-219703), in view of Hunter et al. (US 4,214,867).

Hamada et al. disclose a plate reformer for conducting simultaneous endothermic (steam reforming) and exothermic (combustion) reactions via a stack of bicatalytic reactor cells that include a series of first and second reactor channels; a plate-shaped reforming chamber 2 sandwiched between a pair of plate-shaped combustion chambers 4, all of which contain respective heat exchange sections (plates 5); a plurality of coated thin metal, heat-conductive separator plates and fuel distribution plates 6 for transverse flow of a reaction stream, and forming corrugated regions via a plurality of spheres; a heater operative to preheat a reaction stream; and an inlet and an outlet for the exothermic and endothermic reaction streams, such that the bicatalytic reactor cell is operative to supply an anode 41a of a fuel cell 40 with hydrogen gas (abstract; column 1, lines 6-9; column 2, lines 66-67; column 3, lines 1-67; column 4, lines 1-31 and 55-67; column 5, line 1 through column 8, line 54; and Figures 1-3).

In addition, Furuya et al. disclose a reforming system for supplying a fuel cell system, in which reforming catalysts are placed on the grooves of one side plate and combustion catalysts are placed on the grooves of the other side plate, creating reaction fluid flow passages, with the reforming system operative to conduct simultaneous endothermic (steam reforming) and exothermic (combustion) reactions via a stack of bicatalytic reactor cells that include a series of first and second reactor channels; a plate-shaped reforming chamber and a combustion chamber, both of which contain heat

exchange sections; a plurality of coated thin metal, heat-conductive separator plates and fuel distribution plates for transverse flow of a reaction stream, and forming corrugated regions via a plurality of spheres; and a heater operative to preheat a reaction stream; and an inlet and an outlet for the exothermic and endothermic reaction streams, such that the bicatalytic reactor cell is operative to supply an anode of a fuel cell with hydrogen gas (abstract; and Figures 1-19).

Also, Nakamura et al. disclose a miniaturized fuel reformer for conducting simultaneous endothermic (steam reforming) and exothermic (combustion) reactions via a stack of bicatalytic reactor cells that include a series of first and second reactor channels; a plate-shaped reforming chamber and a plate-shaped combustion chamber, both of which contain heat exchange sections; a plurality of coated thin metal, heat-conductive separator plates and fuel distribution plates for transverse flow of a reaction stream, and forming corrugated regions; a heating unit 112 operative to preheat a reaction stream; and an inlet and an outlet for the exothermic and endothermic reaction streams, such that the bicatalytic reactor cell is operative to supply an anode of a fuel cell with hydrogen gas (abstract; and Figures 1-4).

Although neither Hamada et al., Furuya et al., nor Nakamura et al. discloses the specific metal alloy materials, thicknesses and distances between the thin metal separators, and the herringbone pattern of the flow of the reaction stream (which is higher than atmospheric pressure in the first and second reaction channels per claims 50 and 51), one of ordinary skill in the art would have recognized that the specific metal alloy material, thicknesses/distances of the thin metal separators, and a herringbone

pattern of flow (as compared to conventional parallel flow), would have been obvious to obtain a more efficient and miniaturized bicatalytic reactor cell

Neither Hamada et al., Furuya et al., nor Nakamura et al. specifically discloses the claim 1 limitations that include at least a portion of a first catalyst-coated surface is directly opposite at least a portion of a second catalyst-coated surface on opposing sides of a separator that is shaped to form corrugations.

However, Hunter et al. disclose a method and apparatus for catalytic heat exchange, in which a separator is coated with catalyst to form directly opposed surfaces for heat exchange, in which the separator (membrane) is in the form a corrugated metal strip or foil, which is advantageous for providing improved catalytic combustion and heat exchange for carrying out simultaneous reactions (abstract; column 1, line 14 through column 6, line 62; and Figures 1-3).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the respective structures of the reformers disclosed by any one of Hamada et al., Furuya et al., or Nakamura et al., by using the separator (membrane) formed of corrugated metal strip or foil to form directly opposed surfaces for heat exchange, as taught by Hunter et al., in order to provide improved catalytic combustion and heat exchange for carrying out simultaneous reactions (Hunter et al.; abstract; and column 6, lines 44-62).

Response to Arguments

5. The examiner acknowledges the applicants' response received by the USPTO on June 20, 2006. The examiner's response to the applicants' request for rejoinder (pages 2-4 of applicants' remarks) remains valid (see sections 1 and 6 of this Office Action), and was presented in section 1 of the final rejection mailed July 19, 2005, as well as in section 6 of the Office Action mailed December 20, 2005. Claims 1-24 and 49-51 remain under consideration in the application.

6. Applicants' arguments filed June 20, 2006 have been fully considered but they are not persuasive.

With regard to the applicants' remarks/arguments on pages 2-7 of the response, the examiner respectfully disagrees with the applicants' interpretation of MPEP 821.04 regarding the request for rejoinder on pages 2-4 of the remarks, as there are no product claims within the withdrawn claims 25-48, and claims 1-24 and 49 (Group Ia) were originally elected without traverse. The initial Office Action of July 12, 2004 (requirement for election/restriction) sets forth the rationale detailing the distinctly claimed inventions. In fact, the requirement for election/restriction clearly sets forth the inventions as being related as process and apparatus, rather than process and product. In other words, the applicants' assertion of rejoinder does not apply in this instance, as there are no product claims in this application. It is noted that the applicants state in the last paragraph on page 3 of the remarks, MPEP 821.04 "simply states that the non-elected process claims will be rejoined when the elected product claims are found

allowable". First, the claims elected in this application are apparatus claims. The examiner is perplexed that the applicants state "elected apparatus (*i.e.*, product) claims" in the middle paragraph on page 3 of the remarks. Clearly, apparatus and product claims are not the same. As a result, the applicants are suggested to cancel the nonelected claims and present them in one or more divisional applications for further consideration (also see above paragraph 1). Second, regarding the remarks on pages 4-7 (addressing the rejections under 35 USC 103(a)), the examiner respectfully disagrees with the applicants' assertion that the claims are allowable. As previously set forth, all three primary references in section 4 set forth the structural elements of reformers as claimed, with the exception of the distinct arrangement of corrugations. However, Hunter et al. disclose this structural feature in an analogous catalytic heat exchange environment, and its combination with any of the three primary references is advantageous for providing improved catalytic combustion and heat exchange for carrying out simultaneous reactions (see section 4). It is noted that the applicants are generally attacking the references individually, in particular from the middle of page 4 through the top of page 6 of the remarks.

In response to applicants' arguments against the references individually, as set forth on pages 4-6 of the remarks, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

In response to applicants' argument on pages 6 and 7 that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Hunter et al. include the motivation to provide improved catalytic combustion and heat exchange for carrying out simultaneous reactions (see section 4).

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kevin P. Kerns whose telephone number is (571) 272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin P. Kerns Kevin Kerns 7/7/06
Primary Examiner
Art Unit 1725

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July 7, 2006